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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 21, 1942

Guadalcanal

See Page 326

A SCIENCE SERVICE PUBLICATION

Do You Know?

Eating *eggs* is taboo in large regions of Africa and Asia.

Honey contains mineral elements not found in sugar, and is more easily and quickly digested.

Flying visibility and weather conditions can be estimated to some extent by the color of the *sky*.

Feeding young livestock more *protein*, such as soybean meal, reduces the total amount of feed required for growth.

Destruction of all *chokecherries* within 500 feet of peach trees is the only way to protect peaches from the fatal "X" disease.

A *synthetic rubber* from wood products has been developed in Sweden, suitable for bicycle tires but not for motor cars.

Normally humans absorb 70% of the *carotene* in raw carrots or cooked spinach, furnishing them with vitamin A, but this drops to 50% if there is no fat in the diet.

An area of 150,000 square miles, the Oriente of Ecuador and Peru, is believed to be the world's largest *unoccupied land* available for successful settlement and development.

Mosquitoes, commonly supposed to have a flight limit of 10 to 15 miles, have been recorded by one observer as flying 110 miles across the open sea, under favorable wind conditions.

Question Box

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Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

Delaware is apparently the only one of the 48 states now free from *rattlesnakes*.

Increasing the oil content of *sole leather* from 3% to 5% makes shoes last at least 10% longer.

The *driest* and the *rainiest* spots in the United States are both on the West Coast: Death Valley, Calif., and Gray's Harbor, Wash.

Newly-discovered Canadian deposits of the vital mineral *molybdenite* have been opened up for mining.

There are more than 15,000 *islands* in the mid and south Pacific, in addition to countless coral reefs and atolls.

Intentionally or carelessly started *forest fires* have increased 10% this year over last year, while lightning-caused fires have dropped one-third.

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ASTRONOMY

Nova Puppis

Brightest "new star" in quarter century bursts forth to shine more brilliantly than all but ten stars in heavens. Easily seen in early morning hours.

➤ A NEW STAR or nova brighter than all but ten stars in all the heavens has burst forth and may be seen in the early morning sky. It is somewhat brighter than first magnitude. This is the brightest nova since 1918 and is the most striking and unexpected of astronomical events.

Discovered by an American astronomer in Argentina, the brilliant new star will be known as Nova Puppis, because it is located in the constellation of Puppis, meaning the stern of the ship.

It may become known as this year's Christmas star because one of the explanations of the star of Bethlehem is that it was such a nova.

The new star was discovered on the weekend of Nov. 7-8 by Bernhard H. Dawson, of the University Observatory at La Plata, Argentina. He is an American astronomer, born and educated in Michigan. News of the discovery was received at Harvard Observatory in the form of a brief telegram signed by Enrique Gaviola, director of the Argentine National Observatory at Cordoba, Argentina.

The constellation Puppis, in which the nova is located, is in the southern sky, rising about 2:00 A.M. during November and crossing the meridian about 5:00 in the morning. The nova is situated near the second magnitude star, Zeta Puppis, sometimes called Naos.

But the nova, according to Leon Campbell, recorder of the American Association of Variable Star Observers, outshines all stars in its vicinity, for on the morning of Armistice Day it was of magnitude —0.8 (minus zero point eight) which makes it brighter at present than the star Altair in the eagle.

Those who can find Sirius can easily find the new star. Sirius, brightest star in the sky, rises after midnight in the southeast. An hour and a half later nova Puppis rises, but much farther to the south. Sirius is in Canis Major, the constellation of the big dog, the southern part of which is a triangle of three second magnitude stars. A line from Sirius through the triangle prolonged about its own length will end near the nova.

Not since 1918 has a star of the first magnitude blazed forth. In that year it was during the eclipse of the sun in June that a nova was discovered in the daytime sky.

The nova now in the skies may remain at its peak brightness for several weeks, or it may decline rapidly. Its behavior cannot be predicted exactly. Meanwhile, it alters the appearance of the sky in its vicinity greatly.

Only 20 stars in the whole sky are of the first magnitude. Thus, this star takes its place among the first 20; in fact, it is now the eleventh brightest star in the entire sky and the seventh brightest to be seen from Washington's latitude. It may even get brighter, but usually novae are not seen much before their maximum brightness.

Astronomers will check the position of the nova with those of stars on earlier photographs of the same region to determine which of the faint stars in this part of the milky way suddenly flared up so bright. Novae are not really new at all, but old stars which suddenly increase in brightness hundreds of thousands of times.

Nova Cygni, reported earlier by *Science Service* this year, reached only the eighth magnitude. Nova Puppis is about six hundred times as bright as this was, and Nova Cyygni has now faded to the 15th magnitude.

Science News Letter, November 21, 1942

Seen by Accident

➤ FIRST GLIMPSE of Nova Puppis, obtained by Dr. Edison Pettit of the Mount Wilson Observatory staff was on the morning of Tuesday, Nov. 10. This was an independent discovery of the nova.

Dr. Pettit, who specializes in observations of the sun and not the stars, sighted the nova by accident and not during the course of regular astronomical work. Going out to get the morning paper in front of his home in Pasadena he happened to notice a brilliant star in the constellation of Puppis where no star that bright should be. It is remarkable even that a professional astronomer should notice a new star in this region of the sky since it is very seldom seen by astronomers in the United States. He immediately checked its position with a

MICROSCOPIC MICROSCOPE—Working with watchmaker's lathe, taps, and dies, Joseph P. Kleiber, Bausch and Lomb microscope worker made this tiny model of a standard instrument. It is only two and three-quarters inches high and is a binocular type microscope with revolving eyepiece carrying three objectives.

6-inch telescope in his backyard observatory. What was more important, a photometer happened to be attached to the instrument so that he was able to make an accurate measurement of the nova's brightness. It was then about as bright as Rigel, the brightest in the constellation of Orion, just north of the nova.

Science News Letter, November 21, 1942

Gases Ejected Violently

➤ NOVA PUPPIS is now in the midst of its most violent phase of ejection of gas, it is indicated by observations of its spectrum by Dr. A. D. Maxwell and Dr. Dean B. McLaughlin of the University of Michigan Observatory.

The Michigan spectra show strong interstellar calcium lines and allow estimates that the distance of the nova is such that it took light 1,600 years (traveling 186,000 miles per second) to reach earth and that the actual brilliance of the star is 150,000 times that of our sun.

Dr. Maxwell discovered the new star independently on Armistice Day morning before news of its discovery in Argentina had been received.

The star's spectrum shows strong hazy bright hydrogen bands, conspicuous bright ionized iron and a neutral oxygen band at 6155, with their centers undisplaced. These are bordered on the edges of shorter wavelength by diffuse absorption lines. Absorptions of ionized titanium, magnesium and silicon are also present. No traces are seen of helium or other "hot star" lines. Displacements of absorption lines are discordant. Hydrogen is shifted the equivalent of a motion of 1,100 kilometers (700 miles) per second toward the earth, iron and titanium about 900 kilometers (550 miles) per second, and magnesium somewhat less.

Science News Letter, November 21, 1942

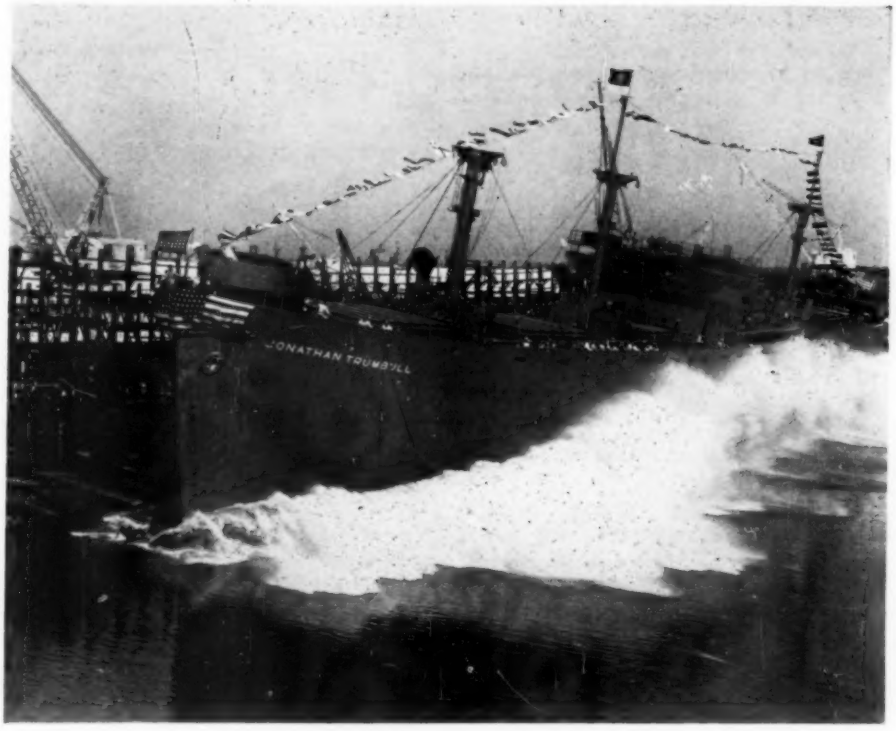
Past Peak Brilliance

➤ PEAK BRILLIANCE of Nova Puppis was apparently reached on November 12 although it is still one of the brightest objects in the night sky.

Cables from Lund, Sweden, report the discovery of the star by Prof. P. Finsler of Zurich Observatory, Switzerland. It was also discovered by George Baird, Oakland, Calif., amateur.

Spectrum photographs at Yerkes Observatory and Michigan indicate that a gaseous shell appears to be expanding around Nova Puppis at the rate of 400 to 700 miles per second.

Science News Letter, November 21, 1942



***SIDE-LAUNCHING** of a Liberty ship which occurred recently, is shown at an undisclosed shipyard. This method is being improved and widely used as it permits construction work in narrow waters. This picture is from the official collection of the U. S. Maritime Commission.*

ENGINEERING

Side-Launching Improved

➤ SHIPS are tumbling off groundways, side-launched by an improved technique announced to the Society of Naval Architects and Marine Engineers by James H. Fahey of Manitowoc, Wis.

These were the first experiments ever conducted, as far as could be determined, using a model submarine for side-launching. The miniature undersea craft was about the size of a rowboat.

Studies included tests for the best angle of tilt for the ship, amount of roll as it strikes the water, velocity of the launching and other factors which affect the safe birth of Uncle Sam's "tin fish."

Instead of the usual wooden cradles, which are used only once, it was first planned to adopt steel cradles which could be used again and again. But experiments showed that there was danger of their edges striking the bottom, so the old method has been continued.

Side launching permits construction of ships in rivers and narrow waters where it would be impossible to obtain the run that is necessary when ships are launched endwise. However, this creates the problem of requiring much water frontage.

Assembly-line methods have now solved this problem, Mr. Fahey reported. A whole row of ships are built parallel to each other, extending back from the water's edge. Starting farthest from the shore, each ship is moved a step closer with each operation, finally tumbling sidewise into the water at the end of the line as it nears completion.

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New Steel for Ships

➤ USE of high elastic steel will reduce weight and improve durability of Uncle Sam's seagoing vessels if tests confirm present indications, declared Edgar P. Trask of New York City, at the meeting.

The proposed steel would be easily flame cut and welded, and have high

corrosion resistance. At least one of the new steels tried so far has been apparently successful in withstanding corrosion under seafaring conditions. Definite acceptance must await further experimentation, Mr. Trask warns.

Some of the steels tried have a stretching strength of 70,000 pounds per square inch and resist atmospheric corrosion four or five times as well as ordinary mild carbon steel.

At a time when shipping tonnage was never more important, use of the new steel would permit extra tons of cargo because of the reduced weight. An oil tanker of 15,600 tons cargo capacity making 25 trips per year, from Texas to New York, for example, would deliver 78,200 more barrels of oil, it is estimated.

"A further saving should be effected," said Mr. Trask, "by the 100% added durability of the high elastic steel."

A 15% increase in earnings for such a tanker due to the increased carrying capacity, is predicted. For a cabin class ship, the increased earnings due to reduced fuel saving would be 6% or over.

"If as great resistance to marine corrosive elements and to liquid cargoes can be had as is said to exist in the new material for railroad equipment against its corrosive elements," declared Mr. Trask, "the predicted saving may be greatly exceeded."

With this important prospect of fuel savings and increased cargo tonnage, Mr. Trask called for further study and development of data related to attainment of these benefits.

Science News Letter, November 21, 1942

MEDICINE

Not Due To Alcohol

Idea is now exploded that cirrhosis of the liver is caused by drunkenness. Although it may play a role, post-mortems show other factors responsible.

➤ "ALCOHOL, contrary to prevailing opinion, cannot seriously be regarded as a specific cause" of cirrhosis of the liver, Dr. Russell S. Boles, associate in medicine at the University of Pennsylvania, declared at the meeting of the Southern Medical Association in Richmond.

"While it is recognized that alcohol may play a role, and perhaps a predominating role in a certain number of cases, it must be conceded that in general, factors other than alcohol are responsible for the cirrhosis," he stated.

In a thorough study of post mortem examinations and histories of thousands of patients dying at the Philadelphia General Hospital, he found that cirrhosis occurred decidedly more often in cases with no history of alcoholism. In one series the figures were 34% of the cirrhosis cases in alcoholics, 66% in non-alcoholics.

Habitual excessive use of alcohol, according to one authority quoted by Dr. Boles, may, however, lead to chronic hepatitis, or inflammation of the liver. This is capable of being completely cleared up when the alcohol is stopped. This alcoholic hepatitis may develop in young men and women who indulge in cocktails daily for three and four days a week and who show as a result a sallow complexion, loss of appetite, irritability and also a tender, slightly enlarged liver.

Dr. Boles always suspects some impairment of function of the biliary tract in most persons who cannot "tolerate reasonable amounts of alcohol without suffering such ill effects as headaches and drowsiness or a so-called bilious condition."

Cirrhosis, even if not specifically caused by chronic alcoholism, is conspicuously associated with it, occurring six or seven times as often in the inebriate as in the temperate or abstinent individual. Life insurance figures covering the periods of prohibition suggest, Dr. Boles pointed out, that cirrhosis diminishes as the consumption of alcoholic beverages diminishes.

"Speaking of the consumption of alcoholic beverages," he commented, "it must be apparent to most of us that there have been conspicuous changes in the drinking habits of the people of this country. The number of individuals who drink has greatly increased, but their taste has definitely changed."

He cited figures showing that per capita consumption of beer, "the chosen beverage of the moderate drinker," has increased, while that of distilled spirits has decreased.

"May it be hoped," he said on this point, "that the day will soon arrive when the fundamental aspects of drinking will be controlled in a sane educational manner and not through recourse to futile and vicious legislation of the prohibition standards."

He commended the efforts of the Research Council on Problems of Alcohol to solve the "many complicated problems that arise as a result of the consumption of alcoholic beverages" and urged an unprejudiced approach to the problem of cirrhosis of the liver, "a chronic, devastating disease causing death to a considerable number of individuals within a comparatively short time."

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"Business as Usual" Out

➤ "BUSINESS as usual" is out for the private physician and the health officer just as it is for the huge industrial concern, the small manufacturer, the butcher and the baker, Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, declared at the meeting of the Southern Medical Association.

Even if available medical services are rationed under National Service legislation, as has been proposed and discussed in recent weeks, great efforts must be made, he warned, to increase the supply of personnel. This means keeping enough physicians in medical schools to teach and train more doctors. Medical students and, if the draft age is lowered, premedical students could, he suggested, be enrolled as a special category of professional manpower and, upon completion of internship, allocated among the Army, Navy and civilian services.

"This," he said, "would eliminate the present uneconomical procedure under which the Army and the Navy compete for medical students by commissioning them in numbers which may later prove disproportionate to the needs of the respective services.

"Much depends now and more will depend after the war upon a continuing flow of young, able-bodied physicians of the highest caliber."

The Medical and Health Committee, he reported, has recently approved a plan for increasing the number of graduate nurses and meeting the growing deficiency in hospital nursing services. The plan calls for speeding up the basic training course for completion in 24 months, after which third year students would go on the payroll of the parent hospital or affiliated institutions. They

would live outside the hospital, thus leaving dormitory and classroom space for more students. They would not receive their certificates until after three years of training, but their release in the last year would supply civilian hospitals with replacements for the general duty nurses who have been drawn into war service. The physical facilities for nurse training would be increased by one-third and hospitals would be provided with an augmented staff for war duty.

The tough job of supplying medical services in critical areas now lacking them, Dr. Parran said, can best be handled after the manner of handling other tough problems, by breaking it up into a lot of little ones and handling them one by one. Following this thought, plans for meeting needs in different communities will be worked out individually. Such plans are now being made by the Procurement and Assignment Service and the Public Health Service.

Health departments must be protected from too great draft of their manpower. Taking one public health physician from his job, he warned, may mean that three private practitioners will be needed to cure the unprevented sickness. Health departments, however, must cut out all frills, unnecessary inspections, complicated record keeping and long-range programs of doubtful value.

Science News Letter, November 21, 1942

New Cancer Theory

➤ A NEW theory on the cause of stomach cancer was presented by Dr. Frank L. Apperly, of the Medical College of Virginia at the meeting of the Southern Medical Association in Richmond.

Stomach cancer and perhaps other cancers, according to this theory, is a deficiency disease. Lack of sunlight and therefore possibly the sunshine vitamin D are suggested as the deficiency which results in stomach cancer.

Much exposure to sunshine has long been known as a cause of skin cancer, but skin cancer is easily cured in its early stages and the mortality is not high. Dr. Apperly has previously shown that in spite of the role of sunlight in causing skin cancer, cancer mortality in the United States and Canada grows less as the amount of sunlight across the continent increases and as more people are exposed to sunshine in farming or other outdoor occupations.

Today Dr. Apperly referred to studies showing that patients with stomach cancer have in general some deficiency of vitamin A. This vitamin and vitamin D are known to work in cooperation. Patients deficient in vitamin A need increased amounts of vitamin D. Lack of sunlight and consequently of vitamin D, on the other hand, may lead to signs of vitamin A shortage. Rats and dogs on an adequate diet but kept in the dark, Dr. Apperly recalled, develop a horny kind of tissue lining the digestive tract.

Vitamin D alone has little effect on rat tumors, other researchers have shown, but when combined with vitamin A it diminishes the number of tumors that develop in a tumor-susceptible strain of white mice and abolishes spontaneous tumors in a tumor-resistant strain.

"These considerations strongly suggest," he concluded, "that lack of sunlight is a factor in cancer of the stomach and perhaps of other sites through lack of vitamin D or other related derivative of ergosterol, perhaps by interfering with the absorption by the intestine of calcium, phosphates, or other substances necessary for the metabolism of cells."

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ASTRONOMY

Why Stars Black Out

Pulsations explain dimouts, too, but stars that pulsate change frequencies like vibrating air in pipe organs. Are brighter than the sun.

➤ STARS of the strange class known as RV Tauri-type pulsate in fundamentals and overtones according to their own whims and fancy. And Dr. Cecilia Payne-Gaposchkin of Harvard Observatory uses real live organ pipes powered by her own lungs to correlate the vibrations of air columns with those of gigantic stars far off in space.

Only 29 RV Tauri-type stars are known, but there were only 13 known in 1927, so they are being found rather frequently. They are stars whose light fluctuations are extremely variable, but in the main, they do strong fadeouts alternated with weak ones. That is, their light becomes very much fainter than normal at intervals, but about in the middle of these intervals, they do a less noticeable dimout. However, these "primary" and "secondary" minimums of light sometimes change places in the RV Tauri stars, and sometimes some of them seem more like Cepheids, another class of variable star which is much more abundant. Cepheid variables are surely pulsaters, and they undergo their alternate contractions and expansions at regular intervals—the principle of harmonic vibrations, well-known to musicians, has been successfully applied to them by Dr. Martin Schwarzschild, of Columbia University Observatory.

But the RV Tauri stars are whimsical, Dr. Gaposchkin told the American Association of Variable Star Observers recently. Sometimes they vibrate in their fundamental tone, she said, and sometimes in the first overtone or harmonic. They may change back and forth at will, thereby producing hitherto unexplainable changes in their light fluctuations. She likened the Cepheids to the heavy and low notes of the long pipes; the so-called Cluster variables to the short high-pitched notes; while the RV Tauri stars were in between, giving pleasant tones of one octave separation.

All such vibrating variable stars are known to be considerably larger and brighter than our sun, which is a "dwarf" star of comparatively quiet habits—to our good fortune.

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ORNITHOLOGY

Guadalcanal Scene Shown In New Bird Exhibit

See Front Cover

➤ VISITORS to the American Museum of Natural History in New York can get a glimpse of what life on Guadalcanal was like in more peaceful times, in a new habitat group showing typical birds of that remote island.

The exhibit is one of four showing birds and their homes in South Pacific islands, collected by a scientific expedition four years ago, under the leadership of the late Lieut. A. B. Fahnestock and his brother, Capt. J. S. Fahnestock.

Among the strangest of the birds shown are the brush fowl, which buries its eggs in a mass of fermenting dead leaves which act as a natural incubator; and the dwarf climbing parrot, a little bird no bigger than a sparrow, that climbs trees like a woodpecker and makes its home in the nest of termites.

Science News Letter, November 21, 1942

INVENTION

Sugar From Sorghum

Yield would be comparable with that from sugarcane by method developed in Department of Agriculture. Over 50 other inventions announced.

➤ SUGAR FROM sorghum, fireproofing, better insecticides and over 50 other inventions have been developed by workers in the U. S. Department of Agriculture in the past year, it is announced in Washington.

Most of the devices were developed to increase farm efficiency, officials stated, but many will have direct importance to everyone in meeting wartime needs.

Sugar yield from sorghum comparable with that obtained from sugarcane, for example, will now be possible for the first time. The process was patented by Emil K. Ventre and Howard B. Paine of the Agricultural Research Administration.

Establishment of an industry to relieve the sugar shortage will result, it is hoped, from research to develop improved sorghum varieties. Some varieties of high sugar content mature early enough, it is pointed out, so that sugar factories could process the sorghum before the sugarcane harvest, using the same equipment.

Attacking the Japs on all fronts includes an improved insecticide for combating the Japanese beetle, a destructive insect in many areas. The new insecticide, developed by Samson R. Dutky of the Agricultural Research Administration, consists of an inert powder mixed with large numbers of germ spores which produce a milky disease fatal to the larvae.

A trap for moths of the tobacco and tomato worms, developed by Lincoln B. Scott and Joe Milam of the Bureau of Entomology and Plant Quarantine, is another device for insect control.

A method for checking the development of rancidity in oils and fats, a process which increases the resistance of nails to withdrawal from wood, and a chemical preparation for fireproofing fabrics, are covered by other patents.

Of the inventions listed by the Department of Agriculture, about half were dedicated to the public and the remainder were assigned to concerns for development, with control retained in the Department.

Science News Letter, November 21, 1942

NUTRITION

Will Not Produce Coffee

Coffee and tea are similar in caffeine content; neither will be grown here commercially. Chocolate does not have same physiological action.

➤ COFFEE and tea production in this country or a satisfactory substitute is not in the offing despite recent rosy rumors born of war shortages.

Glistening white clusters of bitter crystals are dissolved in every cup of either coffee or tea—caffeine upon which Americans have depended for a physical and mental boost. This stimulating chemical has been found in at least six different families of plants in many parts of the globe. But none can be imported any more easily than coffee; none can be quickly grown here.

When you can't get coffee, however, you might be able to brew a cup of tea. Scientists tell us that a strong cup of tea contains about the same amount of caffeine as a cup of coffee and is just as stimulating.

Tests show that caffeine actually causes a quicker, clearer flow of thought and permits more sustained intellectual effort. As its action creeps down the spinal cord, ease of muscular action increases and we are less easily fatigued. Heart muscle is even affected and the beat is speeded. Hitting the vasomotor nerves, caffeine causes the blood vessels to dilate. This, together with the heart action, increases blood flow. Indirectly, this speeds elimination of kidney secretions.

These actions are antagonistic to alcohol and explain why inebriates like a nightcap of coffee.

All in all, coffee has earned its reputation as the American "pick-me-up". And science has now pretty well exploded the theory that moderate use of coffee is harmful in any way to the average normal person.

Kola, ingredient of many soft drinks, also owes its stimulating properties to caffeine. It comes from the Gooroo nuts of trees in far-off Africa and the West Indies.

The change to hot chocolate, planned by many, will not have the same action as that mug of Java or spot of tea. The active ingredient, theobromine, has little central stimulation or effect on the brain, but has an even more powerful effect on blood flow and muscle. There is a relatively small dose in a cup of chocolate, however, and the quantity consumed is not likely to be as great as that of coffee or tea.

Although the African Gold Coast has sent us about 60% of the supply of chocolate-laden seeds from cacao trees, it is also being successfully grown in Central America and Mexico. Natives break open the big red melon-like fruits, remove the seeds and place them in the ground. After a fermentation process, the seeds are roasted and the inner seeds ground into chocolate.

Our coffee is also grown in foreign countries, most of it in Brazil. Formerly the United States drank 50% of the entire world supply. Now consumption is drastically curtailed.

Yarns about coffee being grown in this country need cause no optimism. Even if we had suitable soil and climate (we haven't) and a supply of skilled coffee plantation labor, we couldn't do it. Coffee trees take nearly three years to start to produce, and often it is five years before a good crop is obtained.

Scarcities of tea and coffee will undoubtedly encourage the unscrupulous to adulterate them with other substances. In the past, drug experts have found ground coffee cheapened with materials ranging through dandelion root, cereals, peas, beans, and narcissus bulbs. Tea has been mixed with leaves of mulberry, willow, strawberry, wisteria and many others.

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The most common chronic disease in the U. S. is *rheumatism,* attacking an estimated 6,850,000 people, or about double the number of chronic heart-disease sufferers.

Training for Youth and War Wo

Machines ★ WRITTEN TO CONFORM WITH PRE-INDUCTION TRAINING OUTLINES OF THE WAR DEPARTMENT ★ E

I---Terms Related to Study of Matter

By JOSEPH H. KRAUS
Science Clubs of America Editor

Every mechanic works with matter. Perhaps that statement sounds obvious. But think a bit. There are many important things which concern scientists and laymen, yet are not matter. Heat, for example, is not matter—neither are shadows or thoughts. Shadows are important to aviators; thoughts are important to all of us. But mechanics work with matter; some with wood, others with metal, plastics or glass.

Matter occupies space; has mass and weight, and can be perceived by the senses.

What do we mean by weight, mass, and the other terms applied to matter?

Weight

All matter has or can have weight, because every body is subject to the earth's gravitational attraction. From a lowly pollen grain to a mighty battleship—everything has weight. But weight is variable. On a spring balance you would weigh more, for example, near the north pole than you would at the equator. Also, you would weigh less the higher you ascend in an airplane.

But although your weight is less at high altitudes, you are still the same chunk of flesh and bones—the same quantity of matter. Scientists use the term "mass" to designate the quantity of matter in a body. Thus, the mass of a particular body remains unchanged, regardless of how the body may be shifted about; but its weight, dependent on the force of gravity, may change. Mass is constant, weight is variable—that is the main distinction.

Mass

Wherever the force of gravity remains constant, as it does at any one spot on the earth, mass is proportional to weight, and may be determined by weighing. Thus a pound of apples contains the same quantity of matter, or mass, as a pound of bananas, and the same as the pound weight against which each was balanced. Transport all to 4,000 miles above the earth's surface and both apples and bananas would weigh only a quarter of a pound. But they would still be balanced by the pound weight, because its weight too has been reduced to a quarter of a pound. The change in weight could be detected by a spring scale, but not by balancing one body against the other. This operation compares their masses.

Volume

Volume is simply the amount of space occupied by a body, as measured in cubic inches or cubic feet. For a rectangular body, it can be determined by multiplying together the length, width and thickness. For cylinders and spheres, the radius will also be used. But the volume of a piece of wire screening or some irregular piece of machinery cannot be determined in this way. Here scientific technique comes to the rescue.

If we put an odd-shaped object in a vessel brimful of water, the volume of water that overflows, which we can measure, is equal to the volume of the immersed body.

Impenetrability

Another of the general properties of matter is impenetrability; that is to say, two objects cannot occupy the same space at the same time. When you drive a nail into wood, the fibers of the wood are pushed aside to make room for the nail.

Density

A tennis ball and a baseball have approximately the same volume, but the baseball is much heavier than the tennis ball. More matter or mass is compacted into the same volume. We say that its density is greater.

We may define density as the mass per unit volume of a substance, or say: Density is equal to Mass divided by Volume. ($D = \frac{M}{V}$)

Let's put it another way which is easier to remember. See the diagram at 3. Suppose one of these factors is not known. Put your finger over the representative letter. Now if you know the other two you can find the third. Suppose you want to determine the mass (M) of an object. Cover M with your finger, and you will see that density multiplied by volume is equal to mass. If you want to determine the density, you must divide the mass (M) by the volume (V). And if you want to determine volume, you must divide mass by density.

Experiments

1—Place a milk bottle in a saucer and fill with water until some overflows into the saucer. Empty the saucer and wipe it dry but do not wipe the milk bottle. Lower some odd-shaped object into the milk bottle and catch the overflow in the saucer. Measure the overflow with a kitchen measuring cup or other means. It is equal to the volume of the object you put in the water.

2—Drive a nail into a block of wood and then saw through the center of the nail with a hacksaw. Observe how the fibers of the wood have been compressed.

3—Make up a small button as shown in Fig. 3, the use of which has already been explained.

Review Questions

1. What are some of the terms applied to matter?
2. What is the difference between weight and mass?
3. How can the volume of an irregular object be determined?
4. What is meant by impenetrability?
5. What is density?
6. What is the mass of an object whose density is 4 and volume is 3?
7. What is the density of an object whose mass is 4 and volume is 2?
8. What is the volume of an object whose mass is 4 and density is 8?

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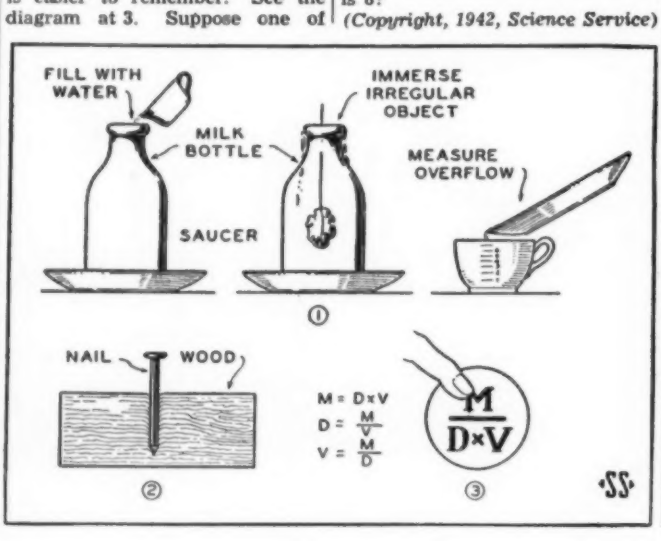


I---Magnetism Explained; M

By DR. MORTON MOTT-SMITH
Science Service Physics Writer

Electricity and magnetism go hand in ha the instruments and machinery used in our and war operations involve both. We begin w

Everyone has seen the little horseshoe ma be purchased at 5-10-cent stores, and know tract iron and steel.

This property is natural in certain iron ores. Lumps of such an ore were picked up by a Greek people who lived more than 2,000 years ago. They noted the power to attract iron. These people were known as the Magnesites, and so the curiously endowed stones they picked up came to be called magnets. Now they are called natural magnets, because most of our magnets today are man-made or artificial; and the property they all possess is now called magnetism.

In the early Middle Ages, mariners learned that an elongated natural magnet hung up by a thread would point to the north. They called it the lodestone or leading stone. Many a ship has been guided by this crude form of the mariner's compass. The Chinese knew all these things long before they were discovered in Western Europe.

Artificial Magnet

An artificial magnet can be made by stroking a piece of steel with a lodestone. Then this piece of steel can be used to magnetize another piece, and so on. Thus all you need to start experiments is to have at least one magnet. Or better, use the electrical method described in Experiment 1.

Soft iron can be very easily magnetized, but loses its magnetism almost at once. Hard steel is more difficult to magnetize but retains its magnetism. Thus we distinguish temporary and permanent magnets.

The end of a compass needle that points to the north is called the north pole, the other end, the south pole of the magnet. If we hang up a magnetized steel needle or bar, as in Fig. 3, it will point to the north like a compass, and knowing which direction is north, we can mark the ends or poles accordingly. If now we bring close another "bar magnet," whose poles have also been determined and marked, we shall find that like poles repel, unlike poles attract.

Poles

If we dip one of these bar magnets into iron filings, tacks or paper clips, we shall find that they cluster about the poles but will not stick in the middle of the mag-

net. The magne concentrated at entirely so. If w we shall find tha at other parts of fewer and fewer dle.

Every magnet poles. Suppose magnetized needl We shall find tha comes a comple north and south as can be verified already described the two pieces a shall have four o as in Fig. 4.

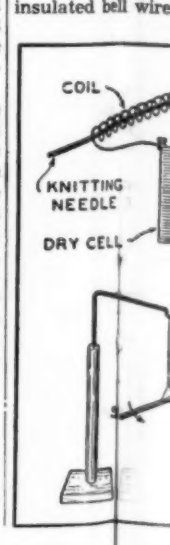
Magneti

Finally, let us t pieces, lay it on t smooth card or over it and sprink the card or glas beneath will be cle the filings which themselves in cur lines passing from magnet to the oth

This experimen there is a field of netic field," in the magnet, and the f us much about it. as we go along t the important thi being only one me ing it.

Experim

1—Wind a few t insulated bell wire



Workers

★ Electricity

ned; Many Uses

TT-SMITH

cs Writer

nd in hand. Nearly all
d in our war production
'e begin with magnetism.
seshoe magnets that can
nd knows that they at-

The magnetic force is thus
ntrated at the poles, yet not
ly so. If we use fine filings,
all find that some will stick
her parts of the magnet, but
and fewer toward the mid-

ery magnet has at least two
Suppose we break a long
etized needle in the middle.
hall find that each piece be-
s a complete magnet with
and south poles at its ends,
n be verified by the methods
dy described. If we break
wo pieces again in half, we
have four complete magnets
Fig. 4.

Magnetic Field

ally, let us take one of these
s, lay it on the table, place a
th card or a piece of glass
it and sprinkle iron filings on
ard or glass. The magnet
th will be clearly outlined by
filings which will arrange
selves in curved streams or
passing from one end of the
et to the other.

s experiment shows that
is a field of force, a "mag-
field," in the space about a
et, and the filings can teach
uch about it. We shall find
e go along that the field is
mportant thing, the magnet
only one means of produc-
.

Experiments

-Wind a few turns of ordinary
ated bell wire around a steel knitting needle as shown in Fig. 1, and touch the ends of the wire for a moment to the terminals of a dry battery or a flashlight cell. This will convert the needle into a permanent bar magnet. The reason for this will be explained in a later lesson.

2—Lay an unmagnetized needle on the table near the edge, and stroke it with one end of a magnetized needle as shown in Fig. 2. Stroke always in one direction, lifting the magnetizing needle high on the return stroke as indicated by the dotted line.

3—Suspend one of the magnetized needles from a stand made of wood or other non-magnetic material, using a thread stirrup to keep it horizontal as shown in Fig. 3. Perform the experiments already described.

4—With a pair of pliers or the aid of a vise, break a magnetized needle in two, and show that each piece is a complete magnet.

5—Place one of the broken pieces under a card, sprinkle with iron filings, and tap. Object of using one of the shorter pieces is to get a better field. If a good bar magnet or a thicker piece of steel can be obtained, the effects will be better.

Review Questions

1. What is the property of magnetism?
2. What is a natural magnet?
3. How can an artificial magnet be produced?
4. What is the difference between a temporary and a permanent magnet? What material is used for each?
5. What are the poles of a magnet, and where are they situated in a bar magnet?
6. What is the law of attraction and repulsion?
7. How many poles must a magnet have?
8. What is the effect of breaking a bar magnet in two?

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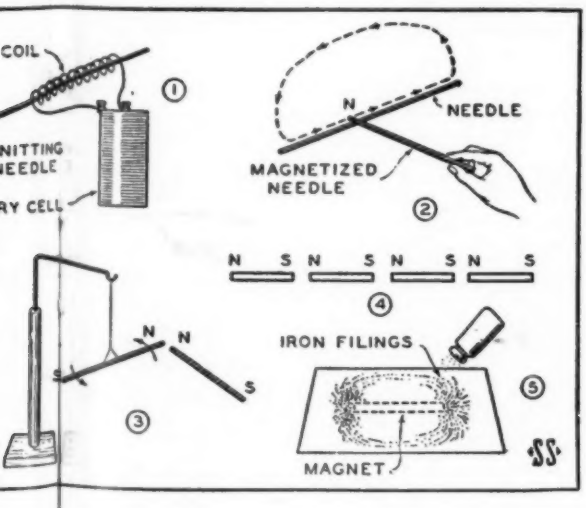

War—It's Technical

All ages, men and women, are urged to study science fundamentals to aid in the war program. Courses being developed in response to Army request.

By WATSON DAVIS

➤ AMERICA'S fighting forces and the great industrial army for production need more technically trained men and women. *Science Service* is answering this call by making it possible for men, women, boys and girls to begin learning the fundamentals of electricity and machines.

The two simple articles on this page are the first of a series sent to newspapers that present the fundamentals of technical trainings recommended in the War Department's official pre-induction training program. (See *SNL*, Nov. 14).

They are shown here, reduced in size of type but otherwise exactly as they will appear weekly in newspapers all over the country.

Anyone who will read these articles carefully, do the experiments, and answer the review questions will have taken the first steps toward better preparation for actual service in the Army or in war work.

Lieut. Gen. Brehon B. Somervell, chief of the Army's Services of Supply, has said:

"Our Army today is an army of specialists. Out of every 100 men inducted into the service, 63 are assigned to duties requiring specialized training. We aren't getting those 63 specialists through the induction centers. Modern warfare dictates that we must have them.

"Yes, we must have these specialists—these men who know the fundamentals of electricity, who know automotive mechanics, who can operate radios or dismantle carbureters. Without them, your Army would be an incongruous mass, incapable for attaining any objective."

The Army through the U. S. Office of Education has asked the high schools of the nation, some 28,000 of them, to begin immediately courses in the fundamentals of electricity, machines, shopwork, radio and automotive mechanics, especially for the boys 16 to 18 years of age who are destined for induction into the Army. Within the next few months more than a million pupils are expected to be taking these special courses, following study outlines recommended by the War Department itself.

Secretary of War Henry L. Stimson praised this cooperation by stating: "No greater immediate contribution can be made by the schools of the nation toward winning the war than to give our youth the basic knowledge and technical skills needed for modern combat. By doing this job well the schools will free resources of the Army for specialized technical, military training."

It is of almost equal importance that older men and women of all ages learn the fundamentals of technology in order that they may make a maximum contribution to the war, in shop, factory and home. Men between the ages of 18 and 45 likely to be inducted in the Army at a later date are being urged by government officials to take these basic courses in evening schools. Both they and the high school boys will earn rapid promotion when they are in the Army if they can show that they have completed these basic courses with credit.

Science Service through newspapers is publishing practical and simple material that may be used for study in these classes or for home study and reading. Any reader will be able to profit from these clear, simple fundamental explanations that are as useful in everyday living as they are in war. The mother who stays at home while her menfolks go to war or work will need this information to meet the emergencies of wartime.

For the first time all high schools throughout the United States have the opportunity of studying the same basic courses. During the summer a corps of educational experts and teachers were assembled by the War Department to outline the material most essential to the Army's pre-induction training program. This outline was made standard for the whole nation.

In many high schools throughout the nation, science clubs are playing a leading role in introducing these war studies into the daily programs of the schools. Science Clubs of America, administered by *Science Service*, with over 2,000 affiliated clubs in high schools, has lent its energies to this war program, especially in connection with the more advanced courses that include radio code practice, touch typing, radio maintenance and repair and advanced auto mechanics.

A shortage of teaching equipment for these science courses has arisen in many schools. In such cases science clubs are cooperating in building needed apparatus or reconditioning it.

ASTRONOMY

Copernicus Honored

Nationwide observance of 400th anniversary of the death of Polish astronomer is being planned for May, 1943. Sponsored by Kosciuszko Foundation.

➤ NATIONWIDE observance of the 400th anniversary of the death of Nicolas Copernicus, Polish astronomer, and the birth of modern science is being planned by The Kosciuszko Foundation for May 24, 1943.

Hundreds of American universities and other institutions have been invited to participate by Dr. Henry N. MacCracken, president of Vassar College and also of The Kosciuszko Foundation, whose letter of invitation was made public recently.

With Poland now associated with the United States in the war of survival and several million citizens of Polish extraction living in this country, it is the desire of the Foundation to make the Quadricentennial of the Polish astronomer one of the greatest scientific tributes of history.

The University of Krakow, the alma mater of Copernicus, has now for the first time in 575 years been closed by the invader. Its professors have been thrown into a concentration camp, and it is understood that two-fifths of them have lost their lives for the crime of being connected with the University of Copernicus. All visible monuments of Polish culture have been destroyed, but today Copernicus stands, Dr. MacCracken declared, the irrefutable answer to the invaders.

The heliocentric system of Copernicus fixed the sun at the center, with the earth and all the planets revolving around it, while the stars were fixed in space at enormously greater distances.

The geocentric system of Ptolemy fixed the earth immovably at the center, with the sun, the other planets, and all the stars as well revolving around it.

The Copernican system revolutionized and enormously expanded man's conception of the universe. The earth, transported to the skies, became a planet. The sun became a star, and all the stars became suns, other possible worlds at vast distances.

The first printed copy of "De Revolutionibus" was brought to the dying Copernicus barely in time for him to hold it in his hand and to know that his great work had been completed.

May 24, 1543, Copernicus died and science was born.

Science News Letter, November 21, 1942

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(★ Currently showing at entrance to New York Museum of Science and Industry, Radio City, New York City.)

MEDICINE

Thyroid Extract May Decrease Bruising

➤ WOMEN recruits to the army of war workers who may get many a bump and bruise while learning unfamiliar kinds of work with heavy machinery may be helped by a discovery at the University of California Medical School of a remedy for easy bruisability.

Small doses of dried thyroid gland extract, the University reports, may be effective in treating women who bruise easily.

The condition occurs predominantly in women with fair complexions, thin-textured skins and symptoms of glandular disorder. The black-and-blue spots, which come from such slight pressures, that usually the victim does not remember the bump which gave them to her, are not due to any defect in the blood's ability to clot, University doctors have discovered.

Probable causes are undue thinness of the skin, abnormal fragility of the smaller blood vessels and defective cushioning of the blood vessels beneath the skin.

Many remedies were tried in the University medical school study, including vitamin K, vitamin C and the anti-pellagra vitamin, niacin. K is the anti-bleeding vitamin, C has an effect on the fragility of blood vessels and niacin has an effect on skin health. None of these proved effective, however, in treating easy bruising.

Thyroid extract is a powerful substance which should not be used without the advice of a physician.

The University report warns against confusing easy bruising, which is of no significance in persons of otherwise normal health, with true purpura, or bruised appearance, that may occur in diseases of the blood, spleen, liver or kidneys.

Science News Letter, November 21, 1942

MEDICINE

Polio Incubation Period Averages 12 to 13 Days

➤ INFANTILE paralysis takes from 12 to 13 days, on the average, to develop after a child has been exposed to the disease, Dr. Albert E. Casey, of Birmingham, Ala., reports (*Journal, American Medical Association,* Nov. 14).

This period, known scientifically as the incubation period, varied from five to 35 days in the 37 cases Dr. Casey studied. The 12-13 day incubation period is compatible, he reports, with that in 11 cases reported in medical literature and with the incubation period in monkeys or chimpanzees inoculated with freshly isolated human strains of the infantile paralysis virus.

Science News Letter, November 21, 1942

RESOURCES

Brazil and Peru Supply Rotenone for Insecticides

➤ PASS the ammunition!

That's just what two good neighbors to the south, Brazil and Peru, have undertaken to do during the next twelve months, to the tune of some 4,500,000 pounds.

The ammunition is rotenone, needed in our unending defense against insects. It is an essential ingredient in fly sprays and other insecticides. It is extracted from the roots of certain tropical plants of the bean family, that grow both in southeast Asia and in the Amazon basin of South America.

Before the war, we used to get a large part of our requirements from Malaya and the East Indies, the rest from South America. Now our two South American friends are coming to the rescue by greatly increasing their exports.

The rotenone-bearing roots will be supplied through regular trade channels and the Commodity Credit Corporation will act as sole purchaser for the United States, paying agreed-on prices.

Science News Letter, November 21, 1942

WILDLIFE

NATURE RAMBLINGS

by Frank Thone

War and Wildlife

➤ SOME forms of wildlife seem to be able to carry on, even between the battle lines, with apparently little or no interruption in their normal lives. It was a common observation, during the first World War, that rabbits and songbirds continued to live in the No Man's Land between the lines, despite barrages and machine gun fire. The song of the skylarks, amid the din of battle, is immortalized in "Flanders Fields."

In the present warfare of movement there is no such thing as No Man's Land. The battle area is Any Man's Land. So the rush and roar of mechanized combat, the trampling of advancing and retreating hordes, may frighten the smaller woodland creatures away from their homes for a short time. Then the battle flows elsewhere, and the land is left empty again—emptier than ever, since the civil population has had its losses and its dislocations, too. Deserted farms, with buildings smashed or burned, may lie fallow for a term, their weeds and brush offering food and cover for small game and birds.

The fate of larger animals will depend largely on immediate circumstances. Soldiers have a way of adding to their meat supply by shooting game without regard to season, so deer and wildfowl are apt to suffer, at least when the armies are not too busily engaged in shooting each other. And when war is followed by a period of anarchy with its inevitable gaunt shadow, famine, even non-game animals will be hunted down for food. That is what happened to most of the wisent, or European bison, after 1918; the present war, surging over the same lands in eastern Europe, will almost certainly wipe out the small remnants of the species that were left.

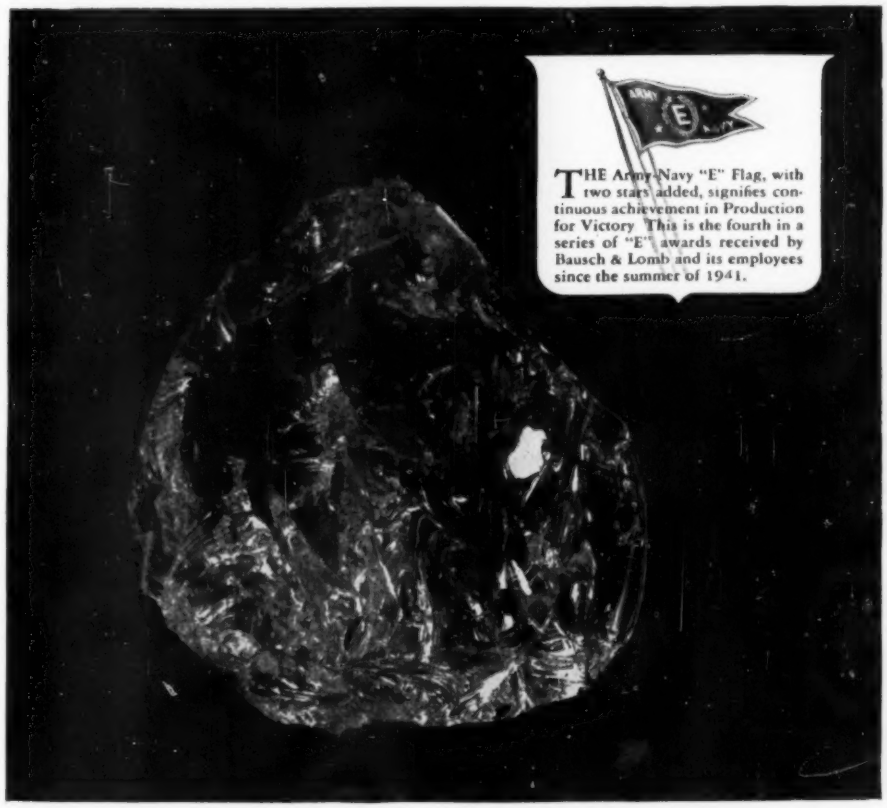
On the other hand, certain great areas of exploitation are neglected or even wholly closed by the war. North Sea fisheries are worked at far lower than normal intensity. Japanese fishermen are barred from North American coastal waters. Even the Mexican and European fishermen are not able to work at full production off the California coast because the Navy has taken the best of their boats, some of the Europeans are interned, and war-production factories have tempted others away from their usual trade.

It is hard to get an even, all-over picture of war effects on wildlife. Conservationists can only hope that the net balance will be favorable.

Science News Letter, November 21, 1942

An estimated 40,000,000 Americans drink *alcoholic beverages,* but only 5% or 6% habitually drink to excess.

Bacteria, not commonly supposed to thrive in sea water, have been found buried in ocean mud three miles deep and a thousand miles from land.


THE Army-Navy "E" Flag, with two stars added, signifies continuous achievement in Production for Victory. This is the fourth in a series of "E" awards received by Bausch & Lomb and its employees since the summer of 1941.

Crown Jewel for Victory

THIS is a chunk of optical glass. It has been broken out of a porcelain pot which came from the furnaces of the Bausch & Lomb Glass Plant.

It may be destined for use in binoculars—the long-range eyes of Army and Navy. It may be one of the types of glass that comprise the optical system of a medical research microscope. Or it may go into service as a range-finder prism, finished to accuracy limits of one second of arc, an error so small that it amounts to only one foot in 39 miles.

Fathered by William Bausch, the B&L Glass Plant was born in 1914. Under impetus of glass shortages in the first World War, it grew to full manhood. Research and development have continued without interruption since, so that today America need not look beyond her own borders for a supply of this essential war material.

One hundred and ten types of optical glass come regularly from the Bausch & Lomb furnaces, to provide the various refractive indices and dispersions required in the lenses and prisms for thousands of scientific instruments.

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PSYCHIATRY

Cruelty Means Weakness

Psychiatrist sees evidence of Nazi weakness. Penalties on civilians may indicate feeling that major opponent cannot be beaten. Apathy toward victory is danger sign.

➤ CLEAR-CUT evidence of growing Nazi weakness can be seen in the harshness and increasing cruelty of the German military machine toward civilian populations, Dr. Emilio Mira, professor of psychiatry at the University of Buenos Aires, Argentina, stated at the New York Academy of Medicine in New York.

Dr. Mira, selected as Thomas William Salmon, lecturer for 1942, was chief psychiatrist of the Republican Army of Spain during the Spanish Civil War.

When an army finds it cannot beat its major opponent it frequently chooses a lesser one and inflicts drastic penalties on the weaker. Dr. Mira termed this "displaced anger."

"Modern warfare is best fought by men who fight with minds unclouded by ferocity," Dr. Mira stated. He explained that a "ferocity closely akin to terror, without skill and without efficiency" frequently results when anger is combined with combativeness, but that there can be good combat work without either anger or eagerness.

Forerunner of defeat for Germany is seen by Dr. Mira in the apathy which victory now brings, in contrast to the enthusiasm in the early days of the war.

"Most countries," he said, "are defeated, long before their material resources are gone, by the fact that the last vestige of elation and enthusiasm is gone. In this respect," he added, "America has a tremendous weight in this war, because elation and enthusiasm have largely left the Axis powers, while you are fresh in your enthusiasm."

So far as the individual soldier is concerned, Dr. Mira found from his studies during the Spanish War that the principal causes of fear states arising during battle were: lack of leadership, overexertion brought on by lack of sleep or food, overwhelming darkness and noise, encirclement, lack of definite plan of action, and the strangeness of the situation in which the soldier finds himself.

People from the farms make better soldiers than clerks or other city dwellers, he found, because the city dweller cannot rely on his lifetime habit of looking to and planning for the future. Greatest hardship for the civilian put into military life, he declared, is the inability to plan from one day to another.

Science News Letter, November 21, 1942

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PUBLIC HEALTH

Women Need Good Training And Living Conditions

➤ THE HEALTH and safety of women war workers depends on attention to adequate training and good living conditions, Miss Mary Anderson, director of the U. S. Women's Bureau, emphasized at the Industrial Hygiene Foundation meeting in Pittsburgh at Mellon Institute.

First line for defending the health and safety of these women consists of proper training in how to do the job and how to use safe technics. Training schemes are essential even for simple industrial jobs, Miss Anderson declared. They should include explanation of dangers and how to avoid them, and instruction in proper dress for safe factory work, since women's ordinary street clothes are not practical for machine jobs.

Second line for defending the health of women war workers consists of provision of proper living conditions.

"Beyond the plant gate, unsatisfactory living conditions take a heavy toll in the health and industrial efficiency of women workers," Miss Anderson said. "Some women carry heavy home responsibilities in addition to full-time jobs. Women workers also have certain housing and recreation needs somewhat different from those of men.

"In some of our war industry areas, many workers are young women away from their homes and families, living in crowded rooms with several others, without adequate opportunities for good meals at reasonable cost, without opportunities for wholesome recreation.

"Such conditions make it likely that tuberculosis, to mention only one disease, will increase, as health authorities predict it will. Tuberculosis deserves special attention because large numbers of women workers are within that dangerous age range most affected by the enemy.

"Management, workers, local communities, State and Federal agencies, must combine forces in attacking conditions outside the factory which lead to illness, absenteeism, and less production."

Science News Letter, November 21, 1942

ASTRONOMY

New Comet Discovered By Finnish Woman

➤ FOR the second time within the year, a Finnish woman astronomer, Miss L. Oterma of Turku Observatory, has discovered a new comet.

This one is in the constellation of Taurus, the Bull, and it is 13th magnitude, much too faint to be seen without telescopic aid.

Radiograms through international astronomical channels to Harvard Observatory, American clearing house for astronomical reports, brought to America news of the discovery. Patrol camera plates at Harvard when inspected by Dr. Fred L. Whipple verified the comet's existence and position.

The new comet is near the celestial equator and moving northward. It is not far from the famous star cluster, the Hyades, shaped like a V, which rises in the eastern sky early these autumn evenings. More observations and considerable mathematical computations will be necessary before it is determined whether the new comet will become brighter.

Two other comets were reported previously by Miss Oterma this year. One of these, discovered in February, was new, although news of it did not reach America until last month. The other report was of a comet spotted by Miss Oterma in September which proved to be a rediscovery of a comet previously known.

Since comets are named after their discoverers, there are thus two Oterma comets in the astronomical records. They are being numbered to distinguish them.

Science News Letter, November 21, 1942

The black powder of the American Revolution could lob a cannon ball about a mile. At the time of the First World War the normal heavy artillery range, with smokeless powder, was about twenty miles.

For this war, chemical research developed a propellant that has a range of hundreds—even thousands—of miles. Already it has carried four-thousand-pound projectiles from somewhere in England straight to the heart of German industry. It has dropped destruction on a Japanese fleet that was nearly a thousand miles from our outposts. From "Shangri La" it sent all Tokio scurrying for cover.

The new "gunpowder," which has changed the whole strategy of war, is *high-octane gasoline.*

In modern aerial war the bomb is the shell, the airplane is the cannon and high-octane aviation fuel is the propelling charge. The side which has the best aviation fuel—the one which gives the most power, the greatest range per gallon—enjoys an advantage of tremendous value.

Fortunately for the United Nations, the development of high-octane gasoline was a triumph of the American petroleum industry. Long before Pearl Harbor, U. S. petroleum chemists were seeking and finding new and better components for aviation fuels—iso-octane, Ethyl fluid and many others—developing processes and facilities for producing these aids to high-octane quality in volume. They advanced the art of refining petroleum from a simple distilling and cracking process to a science of synthesizing special chemicals—then blended these chemicals into fuels of predetermined characteristics and quality. Since Ethyl fluid plays an important part in the manufacture of high-octane fuels, Ethyl research engineers have cooperated with petroleum technologists in their search for better fuels. And because fuels and engines are inseparably related in their development, we work with engine designers in their efforts to get the most from these superior fuels. Today it is our privilege to furnish our product and devote our technical experience to the cause of American victory.

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Manufacturers of Ethyl fluid, used by oil refiners to improve antiknock quality of aviation and motor gasolines.

• New Machines and Gadgets •

❁ *GLASS FIBERS, thinner than a human hair, are being used as a covering for camouflage nets. They can be painted with designs that blend with the surroundings, and often repainted to keep up with seasonal changes. Being light and fireproof the nets cannot be destroyed by incendiary bombs.*

Science News Letter, November 21, 1942

❁ *TABS, LABELS and seals made of adhesive cellulose are extremely messy to handle because the stuff sticks so tightly to the fingers. To eliminate this inconvenience a tab has been invented having perforated strips at each end which are not adhesive. The tab can be handled by these, and after it has been applied to the desired object, the non-adhesive strips can be torn off.*

Science News Letter, November 21, 1942

❁ *GLASS FLOATS for fish nets are now being made to replace the cork, metal or other floats previously used. The glass is thick and spherical, making it difficult to break.*

Science News Letter, November 21, 1942

❁ *BOTH TOOTHBRUSH and powder are carried in a completely closed container of novel form, convenient for the traveler. It has been recently patented. The container for the powder is tall and cylindrical, but a hollow tube passes down the center and through the powder. This accommodates the handle of the toothbrush. A high rounded cap covers the brush itself and seals the unit.*

Science News Letter, November 21, 1942

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THE LANGUAGE OF TOMORROW'S BUSINESS
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It's easy to learn to speak, read and write Spanish this popular new way...and it takes only ⅓ of the time usually required to master a foreign language. Play Solitaire or play the Course with a member of your family or while you entertain friends. Prepare for the thousands of post-war opportunities that will be available to Spanish-speaking men and women when trade with our Latin-American neighbors is at its peak. Remember...2, 3 or 4 persons can learn at no extra cost. 4 decks of cards and Cloth-Bound Text Book, only $2 postpaid.
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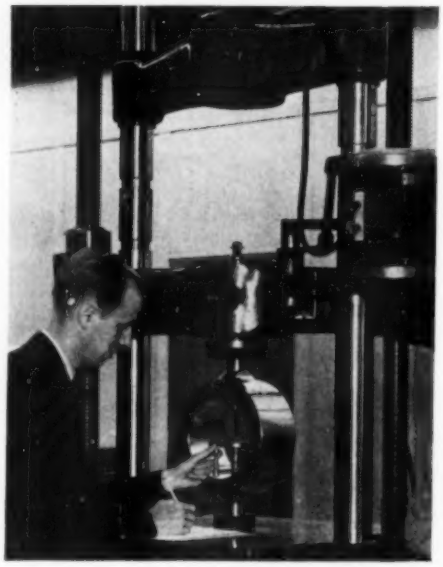

❁ *TESTING a testing machine is what the young man in the picture is doing. The massive steel ring in the center is being squeezed by the descending jaw of the machine. A scientist is measuring the deformation with an accurate micrometer screw. The proving ring, which has been standardized by the National Bureau of Standards, is used to check the accuracy of testing machines throughout the plant.*

Science News Letter, November 21, 1942

❁ *SCRATCHING of celluloid and other plastic sheeting during transport is prevented in an ingenious way by an invention that has been recently patented. The sheeting is coated with a protective film of a material that will evaporate if exposed to the air for a short time. So long as the sheets are laid one on top of another, or the sheeting is rolled up, the substance will not evaporate. This does away with the need of interleaving with tissue paper.*

Science News Letter, November 21, 1942

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 131.*

PHYSIOLOGY

Hiccoughs Before Birth Signal Allergy in Baby

➤ HICCOUGHS in an unborn baby are signals that the child will be allergic to foods, Dr. W. Ambrose McGee, pediatrician of Richmond, Va., warned members of the Southern Medical Association meeting in Richmond.

Heredity, he pointed out, is known to play a part in the development of allergy. He believes that overindulgence in certain foods by the mother may induce an allergic attack, such as hiccoughs, in the inborn baby.

In 21 cases of hiccough before birth, Dr. McGee found allergy in 17 of the mothers, and a history of allergy in the families of two more. Ten of the 21 babies after they were born could not take cow's milk in any form and all of them were difficult feeders, and developed such allergic symptoms as eczema, rash, colic, hives, and even hayfever.

In about one-fourth of the cases, it was possible to bring on an attack of hiccoughs in the unborn baby by feeding his mother specific foods such as chocolate, milk, tomato, grapefruit and nuts and watermelon.

Dr. McGee warned obstetricians to be on watch for hiccoughs in the baby before birth and if they develop to warn the pediatrician, so that the latter can take measures in the way of special feeding to avoid development of allergic attacks in the baby after his birth.

Soybean vegetable milk, and care in giving the baby new foods in small amounts and one at a time were advised by Dr. McGee for infants with allergic symptoms or heredity.

Science News Letter, November 21, 1942

• RADIO

Saturday, December 5, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

No Program November 28

Monday, November 23, 9:15 a.m., EWT; 2:30 p.m., CWT; 9:30 a.m., MWT; and 1:30 p.m., PWT

Science at Work, School of the Air of the Americas over the Columbia Broadcasting System, presented in cooperation with the National Education Association, Science Service and Science Clubs of America.

"Bricks of the Universe" will be the subject of the program.

Books

SCIENCE NEWS LETTER will obtain for you any American book or magazine in print. Send check or money order to cover regular retail price ($5 if price is unknown, change to be remitted) and we will pay postage in the United States. When publications are free send 10c for handling.

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PUBLIC HEALTH

Planned Shifts Urged

Four six-hour work shifts arranged to interfere as little as possible with the individual worker's sleeping, meal and leisure time schedule. Aids war effort.

➤ SHIFT CHANGES at 4 a.m., noon and 8 p.m., with an alternate plan for four six-hour shifts called the red, white, blue, and gold or sunshine shifts, were advised by Prof. Nathaniel Kleitman, of the University of Chicago, at the Industrial Hygiene Foundation meeting at the Mellon Institute in Pittsburgh.

These plans for the multiple shifts needed in war plants cause least interference with the worker's normal sleeping, meal and leisure time schedule and consequently, Prof. Kleitman points out, will reduce fatigue, inefficiency and discomfort. Such shift arrangements have the added advantage of letting shift changes fall at times which are not community rush hours.

Our ordinary cycle of daytime work, evening leisure and night sleep is not inborn but something we learn to follow from early infancy. It can, therefore, be displaced forward or backward by following faithfully a new routine, Prof. Kleitman declared. It takes several weeks, however, for the new cycle to be established and this is "wholly impossible under the system which prevails in some establishments of weekly or biweekly shift rotation," Prof. Kleitman stated emphatically.

The rotation of shifts, followed as a measure of fairness to all workers, should be made once in several months, not weeks or days, Prof. Kleitman advises. The change can be staggered and made to coincide with short vacation periods, in line with the idea that vacations should be distributed around the entire year and not concentrated in the summer. The week-end break problem might be settled, he suggests, by having workers continue on a seven-day week for a number of weeks and then receive a week's vacation.

The shift schedules proposed by Prof. Kleitman are: Red (sunset) shift: Working hours from noon to 8 p.m. Evening and night free for leisure activities. Sleep from 1 or 2 to 10 a.m. Likely to appeal to young unmarried people who like their recreation late in the evening and late morning sleep.

White (Victory) shift: Working hours from 8 p.m. to 4 a.m. Sleep from about 5 a.m. to 1 p.m. Afternoon and early evening free for leisure. Most appealing to middle-aged persons whose social life has altered, whose children have grown up and who therefore would not be disturbed while sleeping during the morning.

Blue (Dawn) shift: Working hours from 4 a.m. to noon. Leisure in the afternoon. Sleep from about 7 p.m. to 3 a.m. Fits in well with schedules of families of intermediate age with small children. Father goes to bed in the early evening when the children do, has the afternoon free for leisure and playing with the babies.

For special situations Prof. Kleitman advises the four six-hour shifts with workers putting in seven days a week. After 20 weeks they will have worked as many hours as in 21 weeks at 40 hours and will have earned and received a week's vacation. Rotation of shifts can be made easily at the end of this vacation.

This plan calls for the Red shift: working hours 3 p.m. to 9 p.m., sleep from 1 or 2 to 9 or 10 a.m. White shift: working hours 9 p.m. to 3 a.m.; sleep from 5 a.m. to 1 p.m.; Blue shift: working hours 3 a.m. to 9 a.m., sleep from about 5 p.m. to 1 a.m.; Gold (sunshine) shift: working hours 9 a.m. to 3 p.m., sleep as usual, at night.

Science News Letter, November 21, 1942

ENGINEERING

Hoover Medal to Swope For Public Service

➤ GERARD SWOPE, president of the General Electric Company, will be the sixth recipient of the Hoover medal, awarded by a committee of the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers. The award will be made in January. The medal honors engineers for public service.

Science News Letter, November 21, 1942

The only Alaska *fur seals* alive in captivity are two in San Diego, Calif.

CHEMISTRY

IN WAR AND PEACE

The latest edition of OUT OF THE TEST TUBE, the fascinating, up-to-date story of chemistry, includes the timely section, "Strategic Raw Materials," and points up chemistry's decisive role in this war.

The distinguished author, Dr. Harry N. Holmes, President of the American Chemical Society, is one of the world's recognized authorities on the subject. Every intelligent person realizes the far-reaching importance of chemistry in shaping the worlds of today and tomorrow. Dr. Holmes sets forth in clear language the romance of chemistry, and explains the fundamental principles of this "vital science" now being used on a scale never before dreamed of.

The general reader, the high school student, the college student, the businessman—all will enjoy and profit from this exciting volume, but more—all will be better able to understand what is going on and what it means. This book will often make clear the *news behind the news.*

"ONE OF THE BEST POPULAR DISCUSSIONS OF CHEMISTRY." — Science News Letter.

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Why Chemists Will Win This War
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First Glances at New Books

➤ ALCOHOL ADDICTION is treated as a disease, not a moral issue, in Volume I of a comprehensive survey on EFFECTS OF ALCOHOL ON THE INDIVIDUAL edited by E. M. Jellinek for The Research Council on Problems of Alcohol (*Yale University Press*, $4.00).

Science News Letter, November 21, 1942

➤ THE TROPICAL CYCLONE in all its essential facts and theories is fully discussed in HURRICANES (2d ed.), by Ivan Ray Tannehill (*Princeton Univ. Press*, $3.75). All the known history that is worth mentioning of hurricanes in the West Indies is also given.

Science News Letter, November 21, 1942

➤ SCIENTISTS, Prof. Edwin G. Boring has said, are of two sorts: those who observe, classify, or enumerate and those who work with hypotheses and build theory. Psychology is divided right down the middle. In SENSATION AND PERCEPTION IN THE HISTORY OF EXPERIMENTAL PSYCHOLOGY (*Appleton-Century*, $5), Prof. Boring traces the history of psychological thinking so far as it has to do with man's awareness of the world about him. Events, in this history, are important only as they changed manners of thinking; emotions, ignorances, prejudices, instruments are actors in the drama because they influenced or inhibited the development of thought. This important book will appeal more to scientists than to students (it is difficult reading) but any reader would find interest in the colorful sidelights on scientific discovery such as that "the chief interest in color lay in getting rid of it in telescopes," or that the first moist battery was built in a vain attempt to prove that animal tissues generate electricity.

Science News Letter, November 21, 1942

➤ A SURVEY COURSE in secondary mathematics for upper grade students preparing for service in the armed forces and industry is offered in BASIC MATHEMATICS, by Walter W. Hart (*Heath*, $1.52). The course extends through trigonometry and logarithms. Practical problems and methods of computation are stressed.

Science News Letter, November 21, 1942

➤ AN ATTEMPT to find the underlying necessities for mental health among individuals and nations is a book by Andrew Shirra Gibb, IN SEARCH OF SANITY (*Farrar & Rinehart*, $5.) Here is food for thought in a world which seems to find this search all too difficult.

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Books of the Week

AN OUTLINE OF ORGANIC NITROGEN COMPOUNDS—Ed. F. Degering and others—*John S. Swift*, 381 p., $6. Planographed.

AERONAUTICS IN THE INDUSTRIAL ARTS PROGRAM: A Handbook for Students and Teachers (Air-Age Education Series) — Gordon O. Wilber and Emerson E. Neuthardt—*Macmillan*, 252 p., illus., 92c.

A. S. T. M. STANDARDS ON TEXTILE MATERIALS—A. S. T. M. Committee D-13—*American Society for Testing Materials*, 408 p., illus., $2.25.

BIOLOGICAL INVESTIGATIONS WITH RADIOACTIVE CALCIUM AND STRONTIUM: Preliminary Report on the Use of Radioactive Strontium in the Treatment of Metastatic Bone Cancer—Charles Pecher—*Univ. of California Press*, 32 p., plates, 50c.

BUREAU OF CHILD STUDY AND THE CHICAGO ADJUSTMENT SERVICE PLAN — Reprinted from the Annual Report of the Superintendent of Schools—*Board of Education, City of Chicago*, 100 p., illus., limted supply available at 25c each. Telling how instruction in a large school system can be individualized.

CULTURE ELEMENT DISTRIBUTIONS: XXI ROUND VALLEY—Frank Essene—*Univ. of California Press*, 97 p., $1.00. Anthropological Records, vol. 8, no. 1.

DEVESCOVINID FLAGELLATES OF TERMITES: III. THE GENERA FOAINA AND PARAJOENIA—Harold Kirby — *Univ. of California Press*, 78 p., illus., $1.

EASY TO BUILD MODELS OF FIGHTING PLANES OF THE UNITED NATIONS—designs by Wallis Rigby—*Garden City*, 27 p., $1.19. Approved by Air Youth, a division of the National Aeronautic Association. The models are perforated in order that they may be pushed out for assembling.

ELEMENTARY SCHOOL SCIENCE FOR THE AIR AGE; A Teacher's Guide (Air-Age Education Series) — Charles K. Arey — *Macmillan*, 145 p., 72c.

EMERGENCY CARE—Marie A. Wooders and Donald A. Curtis, *F. A. Davis*, 560 p., illus., $3.50.

FIRE PREVENTION EDUCATION—Committee for Fire Prevention Education—*National Board of Fire Underwriters*, 355 p., illus., 85c; 10 to 50 copies, 50c; special rates on quantity orders.

FOOD FOR THOUGHT—Herman F. Willkie and Paul J. Kolachov—*Indiana Farm Bureau, Inc.*, 209 p., illus., $2. "A treatise on the utilization of farm products for producing farm motor fuel as a means of solving the Agricultural Problem."

THE FOSSIL BIRDS OF CALIFORNIA—Loye Miller and Ida DeMay—*Univ. of California Press*, 95p., $1.

FREQUENCY MODULATION — August Hund —*McGraw-Hill*, 375 p., $4. Part of Radio Communications Series.

FUNDAMENTAL ORGANIC CHEMISTRY—Ed. F. Degering and others—*John S. Swift*, 485 p., $3. Planographed.

GEOGRAPHICAL GUIDE TO FLORAS OF THE WORLD (Part I)—S. F. Blake and Alice C. Atwood—*Gov't Print. Off.*—336 p., 75c.

HANDBOOK OF FROGS AND TOADS OF UNITED STATES AND CANADA — Anna Allen Wright and Albert Hazen Wright —*Comstock*, 286 p., illus., $3. New edition.

THE HEMORRHAGIC DISEASES AND THE PHYSIOLOGY OF HEMOSTASIS—Armand J. Quick—*Charles T. Thomas*, 340 p., illus., $5.

MAMMALS OF THE BIG BEND AREA OF TEXAS—Adrey E. Borell and Monroe D. Bryant—*Univ. of California Press*, 61 p., illus., 75c.

MECHANICAL DRAWING — Ervin Kenison and James McKinney, revised by Tom C. Plumridge—*American Technical Society*, 330 p., illus., $2. New 1943 edition.

ORE DEPOSITS AS RELATED TO STRUCTURAL FEATURES—W. H. Newhouse—*Princeton Univ. Press*, 280 p., illus., $6.50.

PHYSICAL SCIENCE IN THE AIR AGE: A Teachers' Guide (Air-Age Education Series)—J. G. Manzer, M. M. Peake, and J. M. Leps—*Macmillan*, 198 p., illus., 80c.

REACTION OF TUBES AND OVARIES TO INDUCED VASCULAR SPASM — Paul G. Fuerstner—*Univ. of California Press*, 11 p., illus., 25c.

REGIONAL RESOURCE DEVELOPMENT—Alvin H. Hansen and Harvey S. Perloff—*National Planning Association*, 40 p., 25c. Planning Pamphlets, no. 16.

SCIENCE OF PRE-FLIGHT AERONAUTICS FOR HIGH SCHOOLS (Air-Age Education Series) — Aviation Education Research Group, Teachers College, Columbia Univ. —*Macmillan*, 868 p., illus., $1.32.

SECRETS OF VOICE PRODUCTION, SELF-TAUGHT—Edwin Hopkins—*Edwin Hopkins*, 112 p., 75c., boards, $1.25. Correction.

SEMIMICRO LABORATORY EXERCISES IN GENERAL CHEMISTRY — J. Austin Burrows, Paul Arthur, and Otto M. Smith—*Macmillan*, 337 p., $2.50. Loose-leaf, paper bound manual.

A TEACHERS MANUAL FOR ELEMENTS OF PRE-FLIGHT AERONAUTICS FOR HIGH SCHOOLS (Air-Age Education Series)—Aviation Research Group, Teachers College, University of Nebraska—*Macmillan*, 113 p., 48c.

A TEACHERS MANUAL FOR SCIENCE OF PRE-FLIGHT AERONAUTICS FOR HIGH SCHOOLS (Air-Age Education Series)—edited by George Franklin Stover—*Macmillan*, 248 p., 80c.

TEXTILE PERIODS IN ANCIENT PERU: II PARACAS CAVERNS AND THE GRAND NECROPOLIS—Lila M. O'Neale—*Univ. of California Press*, 64 p., illus., 75c.

YUROK NARRATIVES—Robert Spott and A. L. Kroeber—*Univ. of California Press*, 120 p., $1.25. One of the Univ. of California publications in American archaeology and ethnology.

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